NOTICE

All drawings located at the end of the document.

CI-DOE-00093

REPORT

Sampling and Analysis Plan for the Installation of a 230 kV Transmission Line in the Rocky Flats Buffer Zone

Prepared for:

Public Service Company of Colorado

Prepared by:

Tierra Environmental Consultants, Inc.

1/27

BZ-A-000435

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ACRONYMS

ALARA	As Low as Reasonably Achievable
Am	Americium
ASD	Analytical Services Division
CDPHE	Colorado Department of Public Health and Environment
COC	Contaminant of Concern
DOE	U. S. Department of Energy
DQO	Data Quality Objective
EDD	Electronic Disc Deliverable
EMD	Environmental Management Department
EPA	U. S. Environmental Protection Agency
ER	Environmental Restoration
FID	Flame Ionization Detector
FIDLER	Field Instrument for the Detection of Low Energy Radiation
$HN0_3$	Nitric acid
HRR	Historical Release Report
HSS	Health and Safety Specialist
IHSS	Individual Hazardous Substance Site
IMP	Integrated Monitoring Plan
K-H	Kaiser-Hill
PA	Protected Area
PAC	Potential Area of Contamination
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PID	Photoionization detector
PM	Project Manager
PPE	Personal protective equipment
Pu	Plutonium
QA/QC	Quality Assurance/Quality Control
QAPD	Quality Assurance Program Description
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RIN	Report Identification Number
RMRS	Rocky Mountain Remediation Services, L.L.C.
RPD	Relative Percent Difference
RWP	Radiological Work Permit
SAP	Sampling and Analysis Plan
SOPs	Standard Operating Procedures
SWD	Soil and Water Database
TAL	Target Analyte List
TCL	Target Compound List
TEC	Tierra Environmental Consultants, Inc.
U	Uranium
VOC	Volatile Organic Compound
VSP	Visual Sampling Plan

LIST OF APPLICABLE STANDARD OPERATING PROCEDURES (SOPs)

Identification Number	Procedure Title
RF/RMRS-98-200	*Evaluation of Data for Usability in Final Reports*
2-S47-ER-ADM-05.15	*Use of Field Logbooks and Forms*
RMRS/OPS-PRO.127	*Field Decontamination Operations,*
RMRS/OPS – GT.08	*Surface Soil Sampling*
RMRS/OPS-PRO.128	*Handling of Purge and Development Water*
5-21000-OPS-FO.06	*Handling of Personal Protective Equipment*
RMRS/OPS-PRO.112	*Handling of Field Decontamination Water and Field Wash Water*
4-K55-ENV-OPS-FO.10	*Receiving, Marking, and Labeling Environmental Materials Containers*
PRO-908-ASD-04	*Onsite Transfer and Offsite Shipment of Samples*
5-21000-OPS-FO.15	*Photoionization Detectors and Flame Ionization Detectors*
5-21000-OPS-FO.16	*Field Radiological Measurements*
RMRS/OPS-PRO.101	*Logging Alluvial and Bedrock Material*
RMRS/OPS-PRO.115	*Monitoring and Containerizing Drilling Fluids and Cuttings*
RMRS/OPS-PRO.117	*Plugging and Abandonment of Boreholes*
RMRS/OPS-PRO.102	*Borehole Clearing*
RMRS/OPS-PRO.123	*Land Surveying*
RMRS/OPS-PRO.124	*Push Subsurface Soil Sampling*
RMRS/OPS-PRO.105	*Water Level Measurements in Wells and Piezometers*
RMRS/OPS-PRO.108	*Measurement of Groundwater Field Parameters*
RMRS/OPS-PRO.113	*Groundwater Sampling*
RMRS/OPS-PRO.072	*Field Data Management*
RM-06.02	*Records Identification, Generation and Transmittal*
RM-06.04	*Administrative Record Document Identification and Transmittal*
RMRS/PRO-543-ASD-002	*Initiation, Preparation, and Implementation of Chain-of-Custody Forms*

1.0 INTRODUCTION

Tierra Environmental Consultants, Inc. (TEC) has prepared this Sampling and Analysis Plan (SAP) for Public Service Company of Colorado (PSCo). Activities performed during this investigation are being conducted under guidance provided in the Rocky Flats Environmental Technology Site (RFETS) Integrated Monitoring Plan (IMP) and the Rocky Flats Cleanup Agreement (RFCA).

1.1 Purpose

This SAP describes the surface soil sampling and analysis of 40 sample locations in the four alternative corridors. The corridors are noted as the North Corridor Alternative, the Central Corridor Alternative, the East Access Road Alternative, and the South Corridor Alternative. The corridors are being sampled to determine the surface contamination levels prior to the installation of a 230 kV Transmission Line in the RFETS Buffer Zone. The area of the corridors was established for a 100-foot corridor to address all activities for construction of the transmission line, i.e., line pull locations and road alignments. The surface soil sampling will be performed to ensure construction worker safety and conformance with soil action levels. This project will be performed in accordance with applicable Federal, State, and local regulations and agreements, as well as DOE Orders, RFETS policies and procedures, and Environmental Restoration (ER) Operating Procedures.

Field activities planned under this SAP are limited to collecting a total of forty surface soil samples at the locations specified in **Figure 1-1.** The purpose of this SAP is to define the project data quality objectives (DQO's), tasks, specific data needs, sampling and analysis requirements, data handling procedures, associated Quality Assurance/Quality Control (QA/QC) requirements, and schedule for this project. All work will be performed in accordance with the RMRS Quality Assurance Program Description (QAPD) (RMRS, 1998a, Rev. 2).

1.2 Background and Project Location

1.2.1 Geographical Location

RFETS is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. The cities of Boulder, Broomfield, Westminster, and Arvada are located less than 10 miles to the north, northeast, east, and southeast, respectively. RFETS consists of approximately 6,550 acres of federal land and occupies Sections 1 through 4 and 9 through 15 of Township 2 South, Range 70 West, 6th Principal Meridian. Major plant buildings are located within a RFETS security area of approximately 400 acres, surrounded by a Buffer Zone of approximately 6,150 acres. RFETS is generally bounded on the north by State Highway 128, to the east by Indiana Street (Jefferson County 17) and on the west by State Highway 93. To the south are agricultural and industrial properties.

1.2.2 Site History and Environmental Contamination

From its inception until 1992, RFETS's primary mission was to produce metal components for nuclear weapons. These components were fabricated from plutonium (Pu), uranium (U), and nonradioactive metals, principally beryllium and stainless steel. Parts made at the facility were shipped elsewhere for final assembly. When a nuclear weapon was determined to be obsolete, components of these weapons which had been fabricated at RFETS were returned for recovery of plutonium.

Other activities at RFETS include research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics.

In 1994, RFETS' mission shifted from a weapons manufacturing facility to environmental restoration facility. Emphasis is now focused on identifying and quantifying the facility's environmental liabilities via geological studies, surface and groundwater studies, and geophysical and radiometric studies.

1.3 Topography

The natural environment of RFETS and vicinity is influenced primarily by its proximity to the Front Range of the Rocky Mountains. RFETS is directly east of the north-south trending Front Range, located about 16 miles east of the Continental Divide. RFETS is located on a broad, eastward-sloping system of coalescing alluvial fans at an elevation of approximately 6,000 feet above mean sea level (MSL). The fans extend about five miles east of the Front Range. The Main Plant Complex area is located near the eastern edge of the fans on a pediment between stream-cut gullies or arroyos (North Walnut Creek and Woman Creek).

1.4 Rocky Flats Alluvium

The Rocky Flats Alluvium underlies a large portion of RFETS. The alluvium is a broad deposit consisting of a topsoil layer underlain by up to 100 feet of varying amounts of silt, clay, sand, and gravel. Unconfined groundwater flow occurs in the Rocky Flats Alluvium, which is relatively permeable. Recharge to the alluvium is from precipitation, snowmelt, and water losses from ditches, streams, and ponds that are cut into the alluvium. General movement of groundwater in the Rocky Flats Alluvium is from west to east and toward the drainages. Groundwater flow is also controlled by pediment drainages in the top of bedrock. Groundwater levels in the Rocky Flats Alluvium rise in response to recharge during the spring and decline during the remainder of the year. Discharge from the alluvium occurs at seeps in the colluvium that covers the contact between the alluvium and bedrock along the edges of the valleys. Most seeps flow intermittently. The Rocky Flats Alluvium thins and discontinues east of the Plant boundary. It does not directly supply water to wells located downgradient of the Rocky Flats Plant.

1.5 Other Alluvial Deposits

Various other alluvial deposits occur topographically below and east of the Rocky Flats Alluvium in RFETS' drainages. Colluvium (slope wash) mantles the valley side slopes between the Rocky Flats Alluvium and the valley bottoms. In addition, remnants of younger terrace deposits, including the Verdos, Slocum, and Louviers alluvial deposits, occur occasionally along the valley side slopes. Recent valley fill alluvium occurs in the active stream channels.

1.6 Potential Sources of Contamination

The source of possible surface contamination from plutonium (Pu) in the investigation area is the 903 Pad. The 903 Pad was a drum storage site located in the eastern portion of the Plant security zone and is located in the upwind direction of the areas of interest. The drum storage site was used from October 1958 to January 1967 for storage of radioactively contaminated oil drums (Calkins, 1970). Presented below is a description of drums stored at the drum storage site from Calkins (1970).

"Most of the drums transferred to the field were nominal 55-gallon drums, but a significant number were

30-gallon drums. Not all were completely full. Approximately three-fourths of the drums were plutonium-contaminated, while most of the balance contained uranium. Of these containing plutonium, most were lathe coolant consisting of a straight-chain hydrocarbon mineral oil (Sell Vitrea) and carbon tetrachloride in varying proportions. Other liquids were involved, however, including hydraulic oils, vacuum pump oil, trichloroethylene, perchloroethylene, silicone oils, acetone still bottoms, etc. Originally, contents of the drums were indicated on the outside, but these markings were made illegible through weathering and no other good records were kept of the contents. Leakage of the oil was recognized early, and in 1959 or possibly earlier ethanolamine was added to the oil to reduce the corrosion rate of the steel drums."

Drum leakage was noted at the 903 Drum Storage Site in 1964 during routine drum handling operations (Dow Chemical 1971). Corrective action consisted of transferring the contents of leaking drums to new drums and fencing the area to restrict access. Approximately 420 drums leaked to some degree, and, of these, an estimated 50 leaked their entire contents. An estimated 5,000 gallons of liquid (Freiberg 1970) containing 86 grams (g) {5.3 curies (Ci)} of Pu leaked into soil (Dow Chemical, 1971). A heavy rainstorm in 1967 spread contaminants to a ditch south and southeast of the drum storage site (Dow Chemical 1971). The exact location of the ditch is not provided by this reference, however, the run off from the 903 Pad is now collected by the South Interceptor Ditch, which runs between the source of contamination and the south corridor.

During drum removal and cleanup activities associated with 903 Drum Storage Site, winds redistributed Pu beyond the pad to the south and east. An estimated 1 Ci (16.3g) of plutonium was redistributed beyond the asphalt pad and, of that 1 Ci, approximately 0.56 Ci (9.1g) is believed to have been deposited in the 903 Lip Site (Barker, 1982). The most contaminated area was immediately adjacent to the pad to the south and southeast. Surveys at the time showed a maximum Pu concentration of 2,258 picoCuries per gram (pCi/g) {3,680 disintegrations per minute per gram (dpm/g)} in the top 5 cm (2 inches) of soil at the 903 Lip Site (Barker, 1982).

2.0 DATA QUALITY OBJECTIVES

The data quality objective (DQO) process is a series of steps based on the scientific method designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. EPA has issued guidelines to help data users develop site- and project-specific DQOs (EPA 1994). The DQO process in intended to:

- Clarify the study objective;
- Define the most appropriate type of data to collect;
- Determine the most appropriate conditions under which to collect the data; and
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the design.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The DQO process consists of seven steps. Each step influences choices that will be made later in the process. These steps are as follows:

Step 1: State the problem;
Step 2: Identify the decision;
Step 3: Identify the inputs to the decisions;
Step 4: Define the study boundaries;
Step 5: Develop a decision rule;
Step 6: Specify tolerable limits on decision errors; and
Step 7: Optimize the design.

During the first six steps of the DQO process, the planning team develops decision performance criteria (i.e., DQOs) for the data collection design. All decision rules need to be considered, as appropriate. The final step of the process involves developing the data collection design based on the DQOs. The data collection design is presented in this SAP.

2.1 State the Problem

To summarize the problem, a PSCo 230 kV Transmission Line needs to be constructed in the east Buffer Zone to supply additional electrical power to the Interlocken facilities. Previous investigations near the construction sites have identified various types of surface soil contamination that have been released downwind from the 903 Pad, potentially including Pu. The purpose of this investigation is to determine the presence or absence of potential radioactive contamination located in the surface soils at the construction sites in order to protect worker health and safety and determine conformance with soil action levels.

2.2 Identify the Decision

This step identifies what decisions the study will attempt to resolve, and what actions may result. Characterization data collected for this study will be used to provide for a decision based on soil concentrations. The soil concentrations measured in this study will be used to determine whether the pole placements are being considered in corridors where workers would potentially be exposed to significant levels of radioactive contaminated soils, whether the soils might be subject to remediation, or whether the area might be subject to future control for the protection of surface water.

2.3 Identify Inputs to the Decision

Inputs to the decision include radiochemical results from the surface soils collected from the construction area. The parameters of interest include the analyses outlined in **Table 4-1,** *Soil Sampling and Analysis Program.*

2.4 Define the Boundaries

The investigative boundary is shown on **Figure 1-1.**

2.5 Decision Rules

- Soil concentrations in the proposed alternative cannot exceed 219 pCi/g of plutonium, because of construction worker health and safety. If 219 pCi/g of plutonium is found at any sampling point in the alternative corridor, the alternative corridor will be eliminated.
- Soil concentrations in the excavated materials cannot exceed 115pCi/g of plutonium, because of remediation goals. If 115 Pci/g of plutonium is found at any sampling point, the alternative corridor will be eliminated or remediation actions will take place.
- If soil concentrations in the proposed alternative corridors exceed 10 pCi/g of plutonium, runoff controls may need to be put in place during construction, and consideration may need to be given for future water management structures.

2.6 Limits on Decision Errors

Tolerable limits on decision errors will be described in the Project Health and Safety Plan since the project objective is to ensure worker safety during the installation of the Transmission Line.

2.7 Optimize the Design

Additional characterization, if required, will be based upon an evaluation of data collected under this SAP. If further characterization is required, based on laboratory analytical results, then the results of this investigation will be used to design additional characterization field activities associated with the installation of the transmission line.

3.0 SAMPLING RATIONALE

3.1 Objective

Soil samples will be collected within the four 100-foot wide corridors in order to characterize concentrations of Pu-239 in soils that may be disturbed by transmission line construction activities.

3.2 Sampling Approach

Directed sampling will be performed along the pole location corridors to determine maximum values.

Visual Sample Plan (VSP), the requested sampling tool identified by RFETS, was used to determine the preferred sampling approach. Using the flow chart provided in VSP, it was initially determined that sampling and analysis would not be required because existing data for the areas indicate that concentrations of Pu-239 are much smaller than the action level. [For purposes of this analysis, the RFETS programmatic preliminary risk-based remediation goal for construction worker/subsurface soil (Pu-239 = 2/9 pCi/g) was used as the action level.] However, a decision was made to take a more conservative approach by assuming that the concentrations were not known to be much less than the action levels. Using this revised assumption, it was determined that simple random sampling would be most appropriate.

3.3 Minimum Number of Samples

As directed by RFETS, samples will be collected at each planned pole location. Independent of this requirement, enough random samples will be collected to allow a statistical comparison of sample concentrations with the action level. The minimum number of samples required was calculated by VSP using the following equation:

$$n = 1.16\,[(s^2(z_{1-\alpha} + z_{1-\beta})^2)/\Delta^2 + 0.5\,(z_{1-\alpha})^2]$$

where:

n = the recommended minimum sample size.

s = the estimated standard deviation due to both sampling and measurement variability and was computed from existing data for locations within or adjacent to each of the four corridors.

$z_{1-\alpha}$ = the value of the standard normal distribution that is greater than or equal to $100(1 - \alpha)$ percent of the distribution. α is the Type I error rate, which is the chance of deciding that a clean corridor (one with a median concentration equal to or below the action level) is dirty (has a median concentration above the action level). A value of 10 percent was used for α.

$z_{1-\beta}$ = the value of the standard normal distribution that is greater than or equal to $100(1 - \beta)$ percent of the distribution. β is the Type II error rate, which is the chance of deciding a dirty corridor is clean. A value of 20 percent was used for β.

Δ = the width of the gray region. This is the range of true concentrations where the consequences of deciding a dirty site is clean are considered relatively minor. The upper bound of the gray region is defined as the concentration where the human health, environmental, or political consequences of concluding that the site is clean are relatively significant. The type II error rate is associated with the upper bound of the gray region. A value of 10 percent of the action level was used for Δ.

The resulting calculations indicated that the required number of random samples for the north corridor equals 1, for the central corridor equals 2, for the access road corridor equals 4, and for the south corridor equals 1. The total number of random soil sample locations and pole soil sample locations is 40 (9 in the north corridor, 10 in the central corridor, 12 in the access road corridor, and 9 in the south corridor).

3.4 Sample Locations

VSP was used not only to calculate that the minimum number of samples for each corridor, but also to assign random sample locations to each corridor. A composite graphic depicting the 40 soils sample locations within the north, central, access road, and south alternative corridors are shown in **Figure 3-1**. More detailed graphics depicting soils sample locations in each corridor alternative corridor are shown in **Figures 3-2 and 3-3.**

4.0 SAMPLING ACTIVITIES AND METHODOLOGY

4.1 Surface Soil Locations and Statistical Test

A total of 40 surface soil sample sites were identified and discussed in Section 3.0. Because there was not enough existing data to show that the concentrations of PU-239 in the areas of interest are normally distributed, a nonparametric method of analysis will be required. The Wilcoxon signed rank test is the nonparametric hypothesis test recommended by Visual Sample Plan for comparing the median sample concentrations with the action level of Pu-239. The null hypothesis, which is the starting assumption made regarding the true, but unknown, state of each of the sites, is that the soil concentrations in the alternative corridors do not exceed 10 pCi/g of plutonium.

4.1.1 Health and Safety

Before sampling activities begin, all locations will be cleared in accordance with RMRS/OPS-PRO.102, *Borehole Clearing*. A radiological survey will be conducted before site work begins in accordance with 5-21000-OPS-FO.16, *Field Radiological Measurements*. All necessary health and safety protocols will be followed in accordance with the Project Health and Safety Plan.

4.1.2 Surface Soil Sampling

RFETS defines near surface soils as those soils between the ground surface and 6 inches in depth. This SAP describes the RFETS procedure for obtaining surface scrapes for assessing radionuclide contamination.

Samples will be collected utilizing a stainless steel sampling jig and stainless steel scoops **(Figure 4-1).** The purpose of sampling is to determine the amount of accumulated plutonium and americium that has been deposited on the ground. This determination is accomplished by collecting a sample volume of 5,000 cm^3 of in-situ soil. The jig outlines a square area with 10-cm sides and is driven 5 cm into the soil to cut three sides of the sample **(Figure 4-1).** At the fourth side, soil is removed from outside the jig's perimeter. The scoop is used to finish the cut on both the fourth side of the sample and the bottom surface. Ten sub-samples should be collected at each sample location and composited. The ten sub-samples will be collected at the center and corners of two one-meter squares that are spaced one meter apart. **Figure 4-2** illustrates this sample collection spacing. **Table 4-1** summarizes the analytical requirements for soil samples at RFETS.

Table 4-1
Soil Sampling and Analysis Program

Analysis	Matrix	EPA Method	Container	Preservation	Holding Time
Am-241, Pu- 239/240	Soil	Alpha Spectrometry,N/A	125 ml glass or poly jar	None	Not Specified

4.2 Sample Designation

The Site standard sample numbering system will be implemented in this project as follows: 1) a general Report Identification Number (RIN) sample number will be assigned to the project by the Analytical Services Division (ASD), and 2) a non-RFETS specific sample number will be assigned for internal sample tracking. The block of sample numbers will be of sufficient size to include the entire number of possible samples (including QA samples) and location codes. For reporting purposes, the ASD and RMRS sample numbers will be cross-referenced with location codes.

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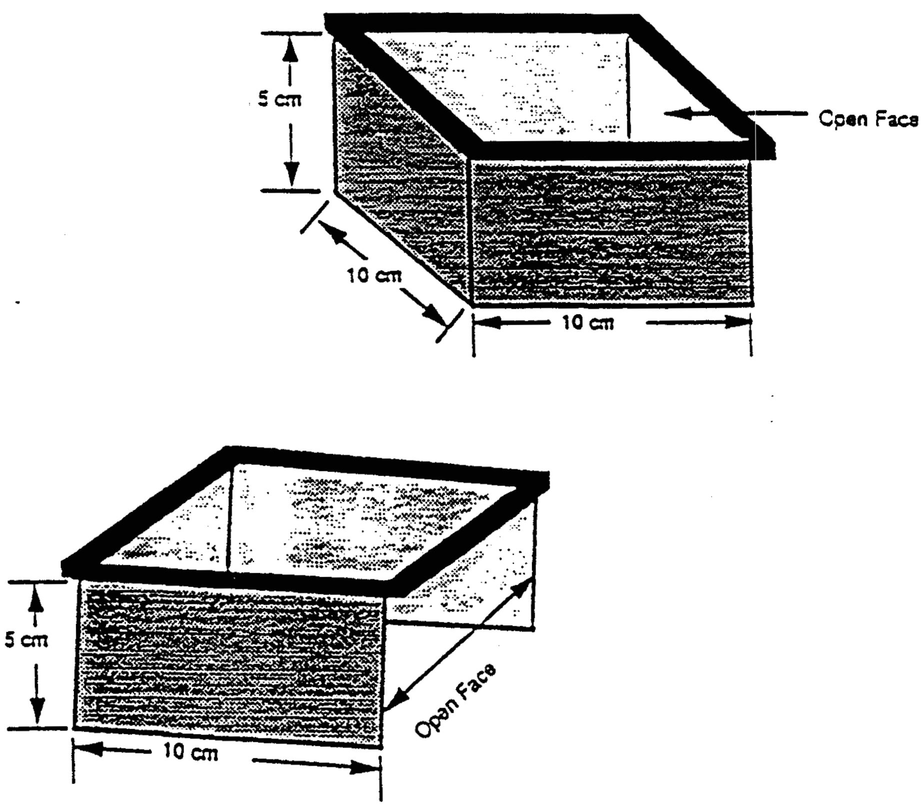
Figure 4-1 Soil Sampling Device

SURFACE SOIL SAMPLING

EG&G ROCKY FLATS PLANT	Manual:	4-E42-ER-OPS
ERM OPERATIONS PROCEDURE MANUAL	Procedure No.	GT.08,Rev.3
	Page:	38 of 41
	Effective Date:	12/8/93
	Organization:	Environmental Restoration Management



NOT TO SCALE

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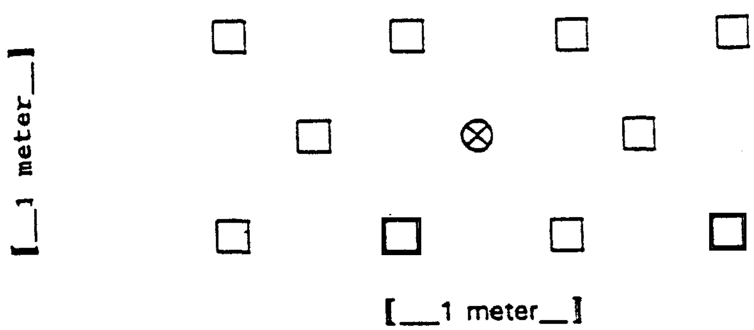
Figure 4-2 Sample Collection Spacing

SURFACE SOIL SAMPLING

EG&G ROCKY FLATS PLANT	Manual:	4-E42-ER-OPS
ERM OPERATIONS PROCEDURE MANUAL	Procedure No.	GT.08,Rev.3
	Page:	39 of 41
	Effective Date:	12/8/93
	Organization:	Environmental Restoration Management



⊗ - Sample Location

☐ - Subsample Location

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4.3 Sample Collection and Analysis

All sampling equipment will be decontaminated with a Liquinox solution, and rinsed with deionized or distilled water, in accordance with OPS-PRO.127, *Field Decontamination Operations*. Field forms will include standard items such as chain of custody seals and forms, drilling logs, field calibration logs and investigation derived materials forms. Samples will be submitted to an offsite, EPA-approved laboratory (S. Cohen & Associates Southeastern Environmental Laboratory) for analysis with a 21-day turnaround time. The surface soils will be analyzed for plutonium utilizing RFETS guidelines for Alpha Spectrometry methods.

Health and safety requirements will be specified in the Project Health and Safety Plan. Personal protective equipment (PPE), air monitoring requirements, and hazard assessments will be addressed in the Project Health and Safety Plan.

4.3.1 Radiological Screening

If necessary, a Health and Safety Specialist (HSS) or Radiological Control Technician (RCT) will scan each sample with a Field Instrument for the Detection of Low Energy Radiation (FIDLER). Equipment will also be monitored for radiological contamination during and after sampling activities. Samples sent offsite for analysis will require evaluation under 49 CFR 173, the U.S. Department of Transportation's (DOT) radioactive materials criteria of 2,000 pCi/g, total radioactivity.

4.4 Sample Handling and Packaging

Samples will be handled according to RMRS/OPS-PRO.069, *Containing, Preserving, Handling, and Shipping of Soil and Water Samples,* and 4-K55-ENV-OPS-FO.10, *Receiving, Marking, and Labeling Environmental Materials Containers*

4.5 Equipment Decontamination and Waste Handling

Reusable sampling equipment will be decontaminated in accordance with procedure OPS-PRO.127, *Field Decontamination Operations*. TEC will handle the decontamination waters generated during the project according to procedure OPS-PRO.112, *Handling of Field Decontamination Water and Field Wash Water.* TEC will also dispose of the personal protective equipment according to 5-21000-OPS-FO.06, *Handling of Personal Protective Equipment.*

5.0 DOCUMENTATION AND DATA MANAGEMENT

A project field logbook will be created and maintained by the project manager or his/her designee in accordance with Site Procedure 2-S47-ER-ADM-05.15, *Use of Field Logbooks and Forms*. The logbook will include the time and date of all field activities, sketch maps of sample locations, and any additional pertinent information not specifically required by the SAP. The originator will legibly sign and date each completed original hard copy of data. Appropriate field data forms will also be utilized when required by the operating procedures that govern the field activity. A peer reviewer will examine each completed original hard copy of data. Any modifications will be indicated in ink, and initialed and dated by the reviewer.

Chain-of-custody documentation will follow PRO-543-ASD-002, *Initiation, Preparation and Implementation of Chain-of-Custody Forms*.

6.0 PROJECT ORGANIZATION

The Project Manager (PM) will be responsible for maintaining data collection and management methods that are consistent with Site operations. The PM is the individual responsible for overall project execution from pre-conceptual scoping through project implementation and closeout. Other individuals assisting with the implementation of this project are the Health and Safety Supervisor who is responsible for overall compliance with and implementation of the Project Health and Safety Plan. The Quality Assurance Engineer will provide the first level of oversight and support implementation of quality controls within all quality-affecting activities of the project. The RMRS Radiological Engineer is responsible for overseeing the development and implementation of and ensuring compliance with the radiological aspects of the Project Health and Safety Plan, As Low As Reasonably Achievable (ALARA) Job Review, and approval of applicable Radiological Work Permits (RWPs).

The Field Geologist/Investigation Lead will be responsible for field data collection, documentation, and directing sampling activities. The Geologist will oversee the Health and Safety Specialist who will be responsible for onsite compliance with and implementation of the Project Specific Health and Safety Plan. In addition, the Geologist will also oversee sampling personnel responsible for field data collection, sample collection, and transfer of samples for analysis. Field data collections will include sampling and obtaining screening results. Documentation will require field logs and completing appropriate forms for data management and chain-of-custody shipment. The sampling crew will coordinate sample shipment for onsite and offsite analyses through the ASD personnel. The sampling personnel are responsible for verifying that chain-of-custody documents are complete and accurate before the samples are shipped to the analytical laboratories.

7.0 QUALITY ASSURANCE

All components and processes within this project will comply with the RMRS Qualify Assurance Program Description RMRS-QAPD-001, Revision 2, April 15, 1998, which is consistent with the K-H Team QA Program. The RMRS QA Program is consistent with quality requirements and guidelines mandated by the Environmental Protection Agency (EPA), Colorado Department of Public Health and Environment (CDPHE), and DOE. In general, the applicable categories of quality control are as follows:

- Quality Program;
- Training;
- Quality Improvement;
- Documents/Records;
- Work Processes;
- Design;
- Procurement;
- Inspection/Acceptance Testing;
- Management Assessments; and
- Independent Assessments.

The project manager will be in direct contact with the QA Engineer to identify and correct potential quality affecting issues. Field sampling quality control will be conducted to ensure that data generated from all samples collected in the field for laboratory analysis represents the actual conditions in the field. The confidence levels of the data will be maintained by the collection of QC samples, consisting of duplicate samples and equipment rinsate samples.

Duplicate samples will be collected on a frequency of one duplicate sample for each corridor. Rinsate samples will be generated at a frequency of one rinsate sample for each corridor. Rinsate samples will be collected only when re-usable sampling equipment is utilized and will be prepared by pouring carbon-filtered water over decontaminated sampling equipment. This shall take place between the collection of regular samples. **Table 7-1** provides the QA/QC samples and frequency requirements of QA sample generation. Data validation will be performed on 25% of the laboratory data. Samples will be randomly selected from adequate subsurface sample sets to fulfill data validation of 25% of the total number of radioisotope analyses.

Table 7- 1
QA/QC Sample Type, Frequency, and Quantity

Sample Type	Frequency	Comments	Estimated Quantity
Duplicate	One duplicate for each twenty real samples		1
Rinse Blank	One rinse blank for each twenty real samples	To be performed with reusable sampling equipment following decontamination procedures	1

Analytical data that is collected in support of this SAP will be evaluated using the guidance developed by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02, *Evaluation of ERM Data for Usability in Final Reports*. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Quantitative values for PARCC parameters for this project are provided in **Table 7-2.** A definition of PARCC parameters and the specific applications to the investigation are as follows:

Precision. A quantitative measure of data quality that refers to the reproducibility or degree of agreement among replicate or duplicate measurements of a parameter. The closer the numerical values of the measurements are to each other, the lower the relative percent difference (RPD) and the greater the precision. The RPD for results of duplicate and replicate samples will be tabulated according to matrix and analytical suites to compare for compliance with established precision data quality objectives (DQOs). Specifications on repeatability are provided in **Table 7-2**. Deficiencies will be noted and qualified, if required.

Table 7- 2
PARCC Parameter Summary

PARCC	Radionuclides
Precision	Duplicate Error Ratio ≤ 1.42
Accuracy	Detection Limits per method and ASD Laboratory SOW
Representativeness	Based on SOPs ,SAP, and analytical methods
Comparability	Based on SOPs and SAP
Completeness	90% Useable

Accuracy. A quantitative measure of data quality that refers to the degree of difference between measured or calculated values and the true value of a parameter. Accuracy is quantitative and usually expressed as the percent recovery of a sample result. The closer the measurement to the true value, the more accurate the measurement. The actual analytical method and detection limits will be compared with the required analytical method and detection limits for radionuclides to assess the DQO compliance for accuracy.

Representativeness. A qualitative characteristic of data quality defined by the degree to which the data absolutely and exactly represents the characteristics of a population. Representativeness is accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest. The actual sample types and quantities will be compared with those stated in the SAP or other related documents and organized by media type and analytical suite. Deviation from the required and actual parameters will be justified.

Completeness. A quantitative measure of data quality expressed as the percentage of valid or acceptable data obtained from a measurement system. A completeness goal of 90% has been set for this SAP. Real samples and QC samples will be reviewed for the data usability and achievement of internal DQO usability goals. If sample data cannot be used, the non-compliance will be justified, as required.

Comparability. A qualitative measure defined by the confidence with which one data set can be compared to another. Comparability will be attained through consistent use of industry standards (e.g., SW-846) and standard operating procedures, both in the field and in laboratories. Statistical tests may be used for quantitative comparison between sample sets (populations). Deficiencies will be qualified, as required.

Laboratory validation will be performed on the data using the accepted RFETS data validation guidelines. The verification will be performed on 100% of the characterization data collected in support of this project. Independent data validation will be performed on 25% of the data once the data package has been received. Data usability shall be performed on laboratory validated data according to procedure RF/RMRS-98-200, *Evaluation of Data for Usability in Final Reports*.

Data validation will be verified independently prior to use. Analytical laboratories supporting this task have all passed regular laboratory audits.

8.0 SCHEDULE

Soil sampling activities are scheduled to begin in Winter of 2001. A summary report will be submitted within 30 days of the receipt of the final analytical laboratory report, prior to the construction phase of the project.

9.0 REFERENCES

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Dow Chemical Company, 1971, *Anonymous Memorandum*, January 15, 1971.

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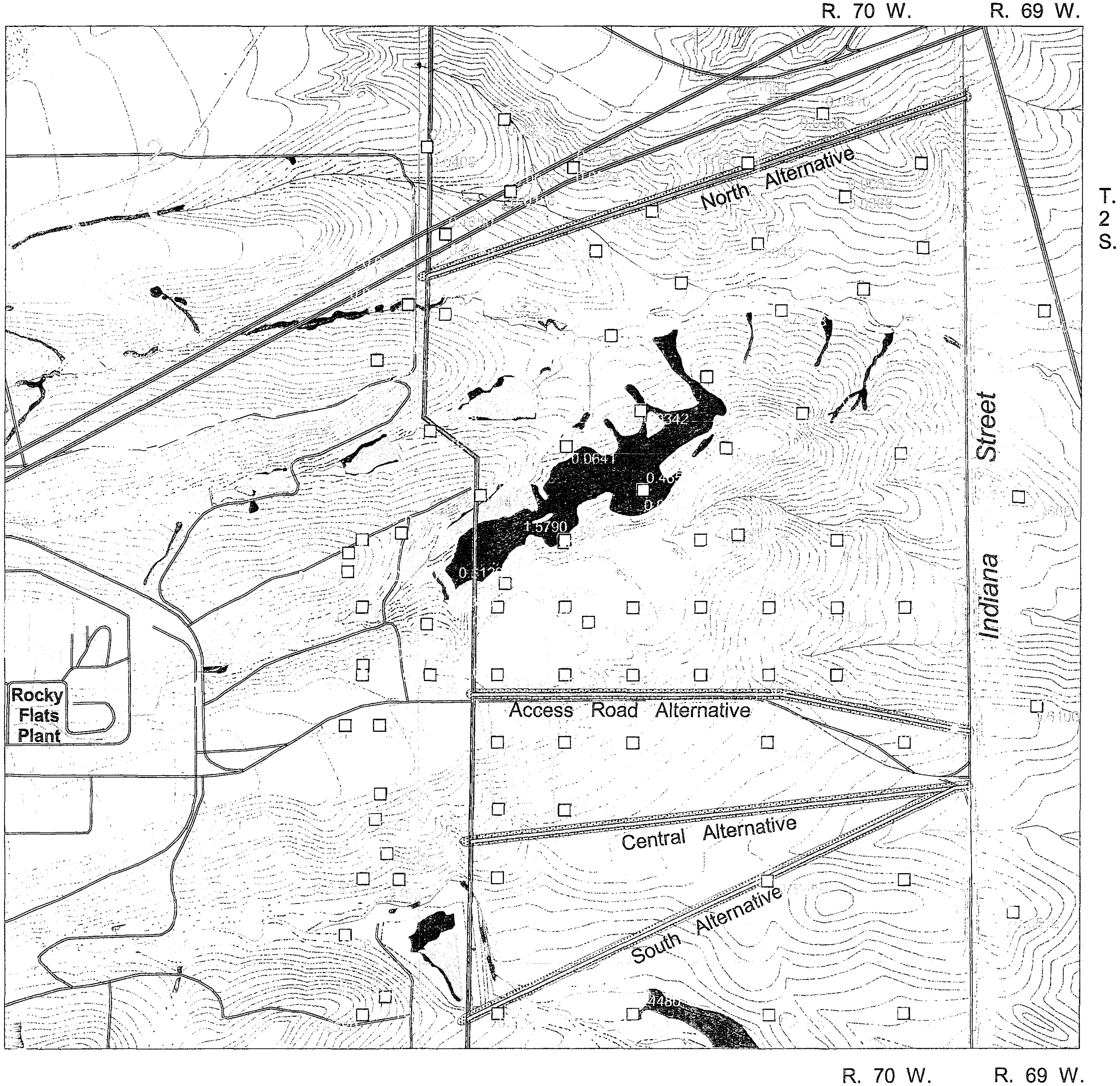
Freiberg, K. J., 1970, *Memorandum to E. A. Putzier, Dow Chemical Company, Rocky Flats Division*, April 14, 1970.



LEGEND

□ Existing Soil Sampling Location Pu (pCi/g)
□ Existing Soil Sampling Location Am (pCiu/g)

Proposed Transmission Line Alternatives - 230kV
Existing Transmission Line - 115kV
Existing Transmission Line - 230kV
Existing Distribution Line

Local Road/Street
Soil Sampling Access Along Existing Road

Stream/Creek
Canal/Ditch
Open Water

Soil Sampling Area

Environmental Constraints

Contiguous Wetland
Protection Area

N

1000 0 1000 2000 Feet

300 0 300 600 *Meters*

State Plane Projection
1927 North American Datum
Colorado Central Zone

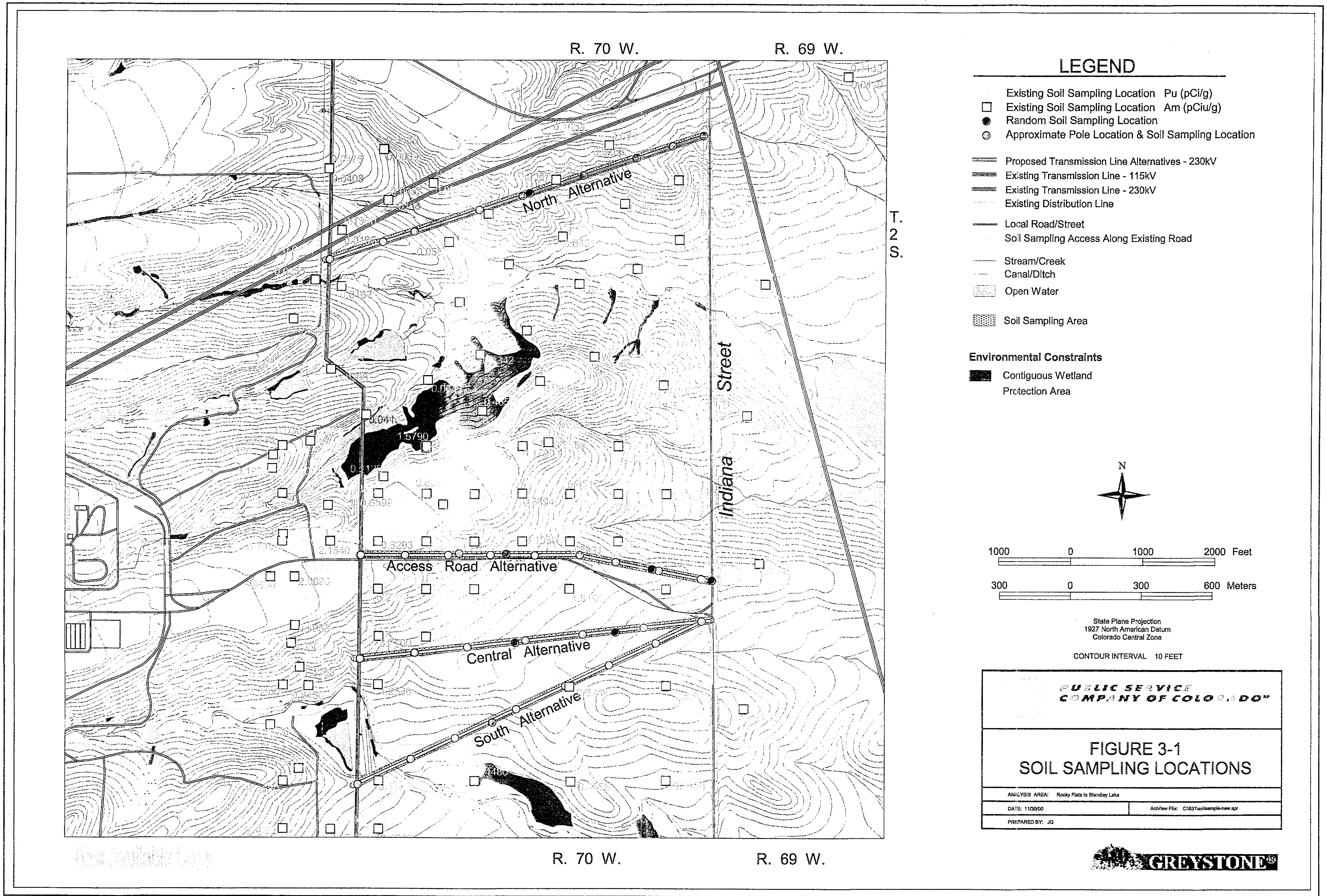
CONTOUR INTERVAL 10 FEET

PUBLIC SERVICE
COMPANY OF COLORADO

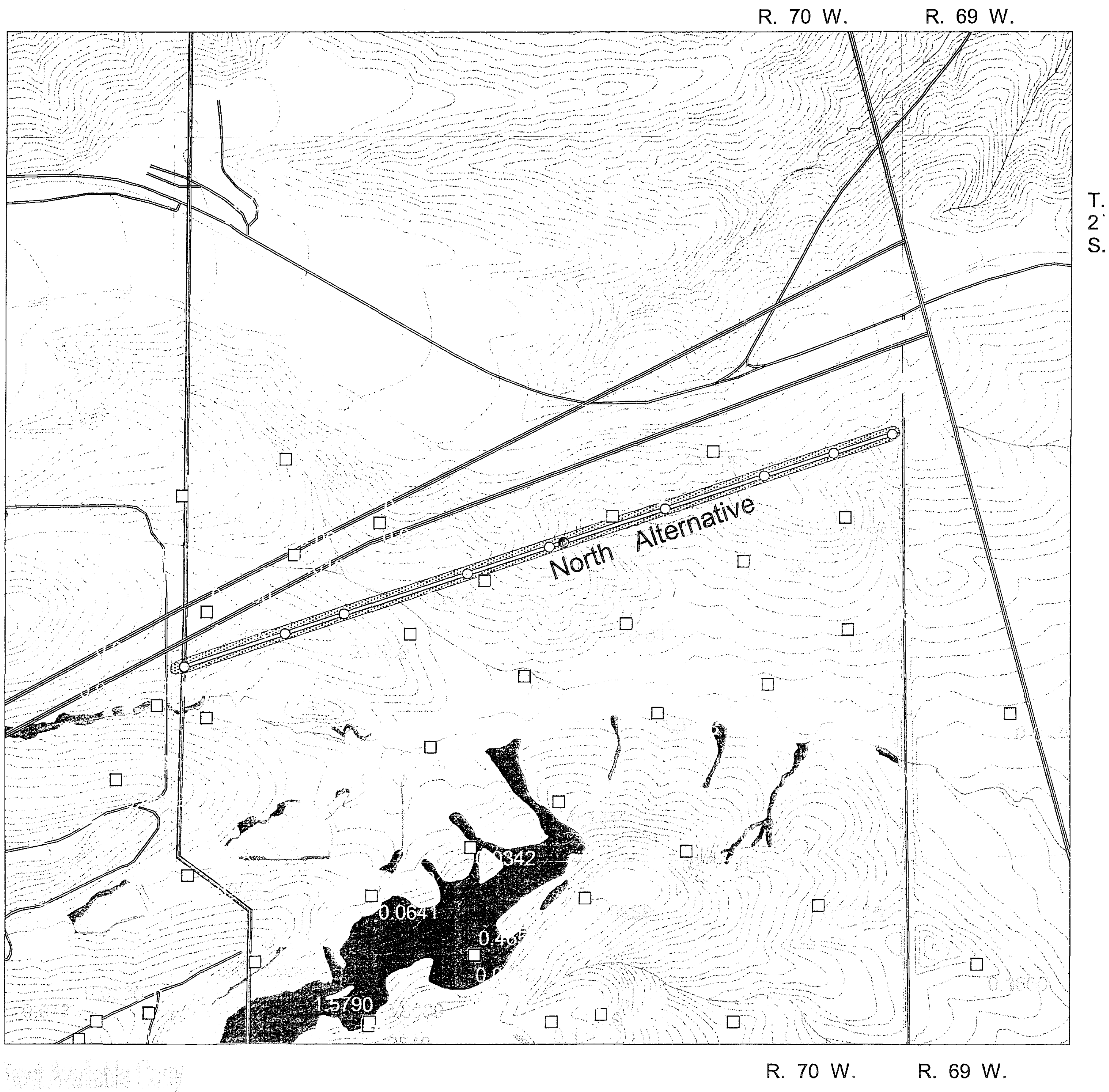
FIGURE 1-1
PROPOSED TRANSMISSION LINE ALTERNATIVES
IN ROCKY FLATS BUFFER ZONE

ANALYSIS AREA: Rocky Flats to Standley Lake
DATE: 11/30/00 ArcView File: C:\831\eo\sample-new.apr
PREPARED BY: JG

GREYSTONE



R. 70 W.
R. 69 W.
T. 2 S.
North Alternative
Access Road Alternative
Central Alternative
South Alternative
Indiana Street
0.0408
0.0165
0.041
1.5790
2.1540
2.0680
0.3293
0.3598
LEGEND
Existing Soil Sampling Location Pu (pCi/g)
Existing Soil Sampling Location Am (pCiu/g)
Random Soil Sampling Location
Approximate Pole Location & Soil Sampling Location
Proposed Transmission Line Alternatives - 230kV
Existing Transmission Line - 115kV
Existing Transmission Line - 230kV
Existing Distribution Line
Local Road/Street
Soil Sampling Access Along Existing Road
Stream/Creek
Canal/Ditch
Open Water
Soil Sampling Area
Environmental Constraints
Contiguous Wetland Protection Area
N
1000 0 1000 2000 Feet
300 0 300 600 Meters
State Plane Projection
1927 North American Datum
Colorado Central Zone
CONTOUR INTERVAL 10 FEET
PUBLIC SERVICE COMPANY OF COLORADO
FIGURE 3-1
SOIL SAMPLING LOCATIONS
ANALYSIS AREA: Rocky Flats to Standley Lake
DATE: 11/30/00
ArcView File: C1831\soilsample-new.apr
PREPARED BY: JG
GREYSTONE



LEGEND

Existing Soil Sampling Location Pu (pCi/g)
□ Existing Soil Sampling Location Am (pCiu/g)
● Random Soil Sampling Location
○ Approximate Pole Location & Soil Sampling Location

Proposed Transmission Line Alternatives - 230kV
Existing Transmission Line - 115kV
Existing Transmission Line - 230kV
Existing Distribution Line

Local Road/Street
Soil Sampling Access Along Existing Road

Stream/Creek
Canal/Ditch
Open Water

Soil Sampling Area

Environmental Constraints

Contiguous Wetland Protection Area

N

700 0 700 1400 Feet

200 0 200 400 Meters

State Plane Projection
1927 North American Datum
Colorado Central Zone

CONTOUR INTERVAL 10 FEET

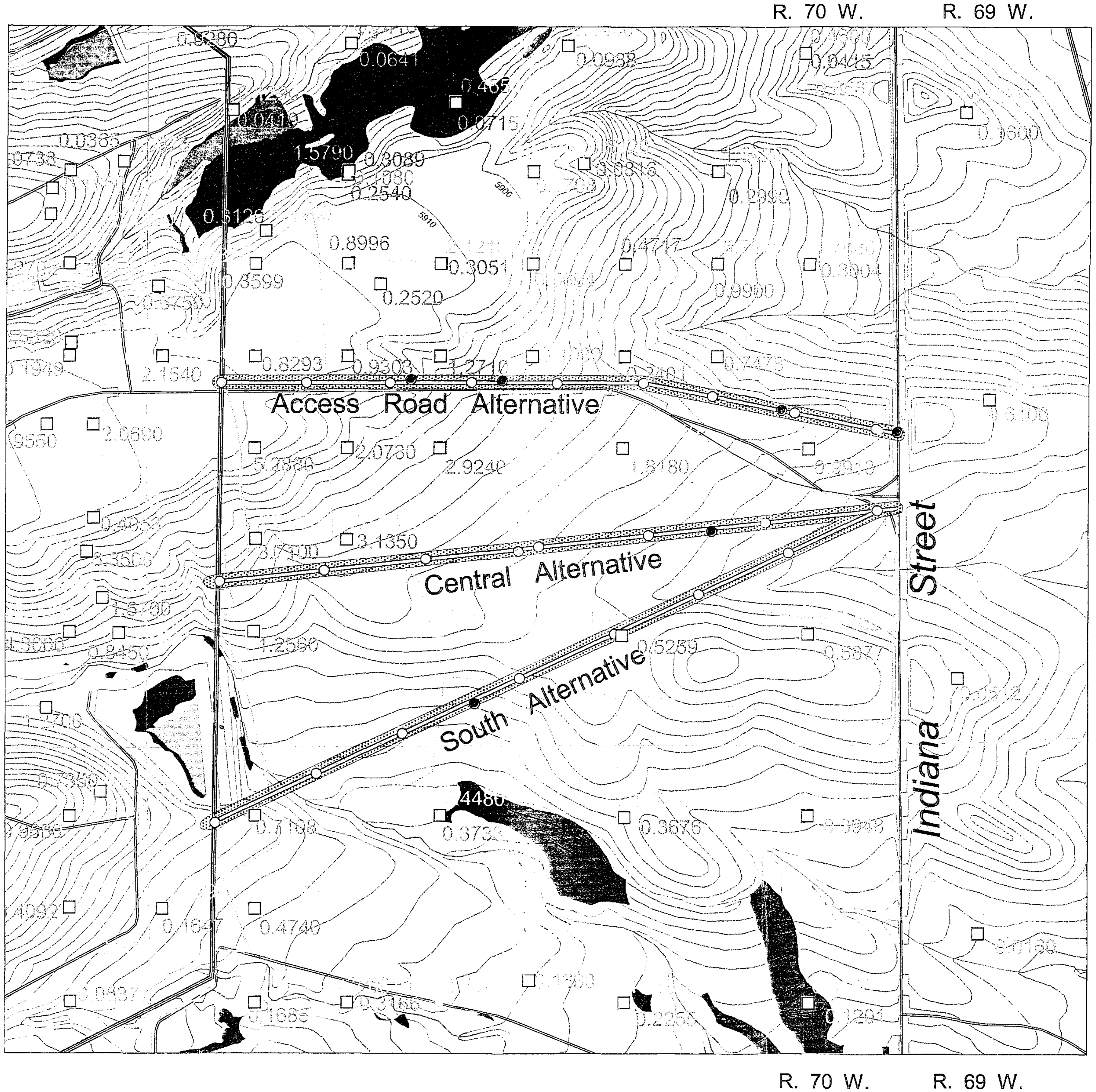
FIGURE 3-2
SOIL SAMPLING LOCATIONS
NORTH ALTERNATIVE

ANALYSIS AREA: Rocky Flats to Standley Lake

DATE: 11/30/00 | ArcView File: C\1831\soilsample-new.apr

PREPARED BY: JG

GREYSTONE



LEGEND

- □ Existing Soil Sampling Location Pu (pCi/g)
- □ Existing Soil Sampling Location Am (pCiu/g)
- ● Random Soil Sampling Location
- ○ Approximate Pole Location & Soil Sampling Location

- Proposed Transmission Line Alternatives - 230kV
- Existing Transmission Line - 115kV
- Existing Transmission Line - 230kV
- Existing Distribution Line

- Local Road/Street
- Soil Sampling Access Along Existing Road

- Stream/Creek
- Canal/Ditch
- Open Water

- Soil Sampling Area

Environmental Constraints

- Contiguous Wetland Protection Area

N

700 0 700 1400 Feet

200 0 200 400 Meters

State Plane Projection
1927 North American Datum
Colorado Central Zone

CONTOUR INTERVAL 10 FEET

PUBLIC SERVICE COMPANY OF COLORADO

FIGURE 3-3
SOIL SAMPLING LOCATIONS
SOUTH, CENTRAL & ACCESS ROAD ALTERNATIVES

ANALYSIS AREA: Rocky Flats to Standley Lake
DATE: 11/30/00
ArcView File: C:\831\soilsample-new.apr
PREPARED BY: JG

GREYSTONE